

## BIG DATA ANALYTICS FOR DIGITAL HEALTH CARE

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### ABSTRACT

*In recent years, health care industry produces the various types of data with large number of quantity. Handling the heterogeneous data without digital transformation is an incomplete task. Digital transformation plays important role in handling the data. Heterogeneous data may involve either structured or unstructured data. For stimulating the process with digital transformation, Big data plays the important role in digital transformation. Big Data has many analytic tools and techniques for handling the various types of data in an efficient manner by analyzing the data with different tools. By automating the process of Health care industry with big data tools and techniques, the relationship between patients and the doctor can be improved as well as it enhances the entire health care service system.*

**KEYWORDS:** Big Data, Health Care, Digital Transformation, Structured & Unstructured

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### 1. INTRODUCTION

Digital Transformation is emerging with high impact in the health care industry. The goal of the industry is to give the better experience to the patients. Now, clinical care centre made enormous changes through technological innovation. With the Digital transformation, patient care elevated to levels, which are not possible some time ago. To make the digital transformation in one among the process of the industry, the business process of the health care should be modified. By using digital technologies, the health care industry manages the data more than petabytes. The industry may follow either standard format for collecting the data or depend upon the person it may be varied. In structured data, the patient information is collected in the standard format. But in unstructured data, the data related to the corresponding patient disease is stored. So, it is varied from one person to another person. Digital transformation is not worthy until implementing a business with the big data. For effective and complete transformations, the role played by the big data is more important. Big data provides the following benefits in respect with health care. Mainly, Electronic Health Record is maintained. In this record, it stores all the information about the patient in digital form. This information can be shared with private and public organization through secure information systems. It allows the doctor to change any record at any time without duplication. Using this information, it alerts the patients when it is time to get new test or check routine prescriptions. By analyzing the patient information, the software can easily identify the inconsistency between the 'patient's health and prescription provided by the doctor. It alerts both the doctor and the patient when there is a risk in the patient's health. With the Big Data, the health care companies can perform prediction analysis about admission rates and which helps to increase their facilities. Another important factor, it supports to identify what disease becomes the major problem in future. In [3], the author discussed about the importance of Big Data tools and techniques used in health care for predictive analytics. These tools help the industry to predict the future in advance and prevent the patients from the diseases by earlier prediction [4]. This paper is organized as

follows. Digital Information and Health care Analytics, Big Data and its Characteristics, Impact of Big Data in Health Care Industry and Conclusion.

## **2. DIGITAL INFORMATION AND HEALTH CARE ANALYTICS**

### **2.1 Big Data Analytics**

It redefines the mechanism of digital Health care industry. It helps to prevent epidemics, reduce costs and prevent from diseases. The health care industry is expanded with more population than some years ago. Big data plays more significant role in improving patient satisfaction by streamlining the data. The patient-oriented service is provided by implementing the process with new mechanisms of big data for earlier detection of the spreading disease and to provide better treatment by monitoring the flow of data. Smart devices are the excellent platforms for delivering behavioural changes in the patient to improve their health conditions.

### **2.2 Wearable Devices**

Wearable devices are used nowadays. It measures the vital information from sensor devices placed on human bodies. This information is used to maintain the health of a patient. It allows the patient to monitor their health in real time. Nowadays, the exploration of the wearable technology is becoming popular and emerging into the increased usage by the patients for collecting the personal health information and other user data [5].

### **2.3 Tele Medicine**

Dream of every patient is to have treatment when they are needed. It comes true with the medicine. Now, the poor people also get the same treatment like rich person. The success of telemedicine lies in digital transformation and through telemedicine; the information technology penetrates the remote village also. To accomplish this, there is a need for bridging the gap between digital age groups and professional groups [6].

### **2.4 Machine Learning**

Machine Learning has many tools for future prediction. The tools like SVM classifier, Nearest Neighbour, and Regression are used for predicting the diseases. Patient can predict the disease before come to the treatment by using machine learning. In [7], the author discussed about the importance of Artificial intelligence with machine learning for simulating the human activities. It brings a large number of analytical techniques. Those techniques can be used to analyze any type of data and to give the prediction results well in advance with the help of machine learning.

### **2.5 Visualization**

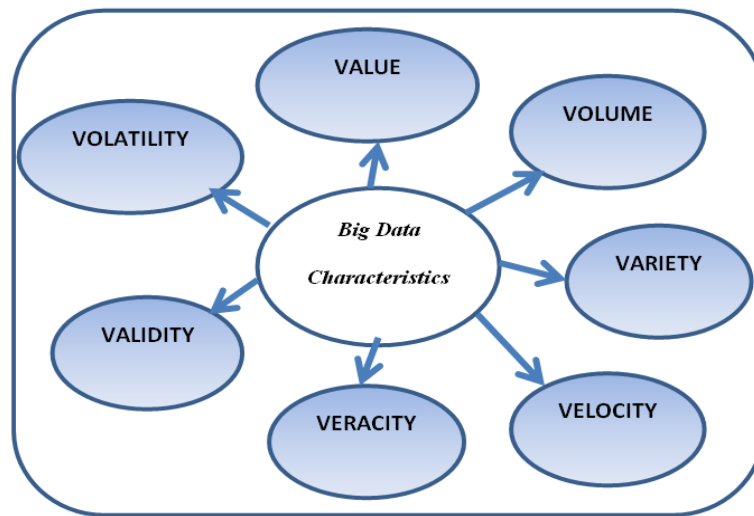
Visualization means does not give the real picture. Pictures can be viewed in 3D images. It is more possible for understanding the organs of the human body with the virtual reality. We have to pay specific attention in which interpretability can be addressed with the data and model visualization. To provide the better clinical and health care practice, the efficient design for data analysis must be developed. While designing the data analysis with the help of machine learning, the consultation with the medical experts are needed for an efficient analysis. Otherwise, the uses of machine learning are like a normal procedure followed in health care [8].

## **3 BIG DATA AND ITS CHARACTERISTICS**

Number of characteristics of big data is varied from one author to another author. Here, seven characteristics of a big data related to the Health care are given. This is described as 7"V"s.

### 3.1 Volume

It is the best known characteristic for health care. The amount of data produced by health care industry is quite staggering.



**Figure 1: Big Data Characteristics.**

### 3.2 Variety

Variety of data is arrived in health care industry. Most data produced by the industry are unstructured data. It may include the sensor images, the different music formats and other formats.

### 3.3 Velocity

The data rate means at what speed the industry generates the data .Nowadays, each and every second, and the speed of data created by the industry is rapidly increasing. Today, health care industry produces the petabytes of data even exabytes of medical data.

### 3.4 Veracity

It represents the reliability of the data source. It describes how much it is meaningful when analysis is done with the data generated from the corresponding source.

### 3.5 Validity

It is similar to veracity; validity refers to the rate of data accuracy. It shows that any analysis done how much it is accurate.

### 3.6 Variability

It refers to a different thing. There may be any number of inconsistencies in the data. To find the meaningful analysis, anomaly and outlier detection methods are used. It also refer to the inconsistency in speed .Health care data is variable because data generated from different sources.

### 3.7 Value

The important characteristics in big data are value. If correct value is not given by industry then the result produced by the remaining characteristics become meaningless. The value means give the improvement in optimization process, better understanding of customers and improving the performance.

## **4. IMPACT OF BIG DATA IN HEALTH CARE**

Here, big data impact in today and future is going to be discussed.

### **4.1 Transparency**

The majority of the health care data is not accessible over the internet. Many Giga bytes of data is locked by the doctors, hospitals, research laboratory and government databases. This system prevents transparency throughout the health care organization. The future of health care operations depends on integration. Once the integration is achieved, the people can share data freely over the internet.

### **4.2 Cost and Time Saving**

Usage of wearable devices is increased nowadays, to monitor the state of the patients and avoiding hospitalization. For hospitalized people, using predictive analytics to improve the prediction result and decrease re admissions. Big data analytics helps medical professionals to collect and analyze the data to gain meaningful result. New cost effective solutions are provided by big data for both structured and unstructured data.

### **4.3 Better quality of services**

Perfect analysis can be done with the predictive analytics tools in big data to provide the expected results of a patient. Based on existing information algorithms may deliver personalized treatment. Personalization means matching the medical prescription to the person's history develop the automated system by considering the different factors of the person including their lifestyle. This system absorbs the large amount of data and analyzes it in useful manner and produce the better service in quality and time.

### **4.4 Security**

Big data significantly enhances the security in patient privacy information in health care. The security can be added in different levels. Since the data is generated from the different geographical locations, the data may bring additional risks to the system. Big data can be implemented with added security by using the feature the cloud-based solution. Environment is protected to secure the data from the hackers.

### **4.5 Real-Time Access**

Emerging medical technology gives the power to the health care professionals for tracking the origin, risk level, and estimated spread of communicable diseases. The cutting-edge algorithms have the ability to predict the spreadable disease.

## **5. CONCLUSIONS**

In today's competitive world, pressure level of the health care organizations is increased to build a world-class user experience. To accomplish this, it has to change the ways used for providing a patient experience. Big data allows the organization to share the information to maximize the value. Health care companies are using the digital technologies to make strategic asset by bridging the gap between the digital technologies and the legacy in complex information. Several health care organizations are yet in the development phase. It should come forward in implementing the digital health care with big data to provide the meaningful results.

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